

JOB COMPLETION REPORT
INVESTIGATIONS PROJECTS

State of IDAHO

Project No. F 1-R-1 Work Plan No. II Job No. _____

Title of Job Trapping Chinook Salmon in Elk Creek

Objectives: To determine accurately the size sex, and number of chinook salmon using Elk Creek for spawning, and determination of fecundity, sex ratios, correlation of spawning with water temperatures, weather and stream flow.

Techniques Used:

I. TRAPPING. - A 90-foot section of Elk Creek was enclosed by construction of two sections of rack across the stream. The upstream rack formed a migration block. The downstream section included a throat-type trap aperture to permit upstream migration over this section but which prevented downstream passage. Tripod horses were placed across Elk Creek and anchored in position with boulders. Lodgepole-pine poles were attached to these horses to form an upper and lower nailing structure for the 2 x 2 pieces of racking which were nailed in vertical position with one end snug against the stream bed. Because the stream bed at this point was composed of fine gravel and sane, it was necessary to fill in under the racking with coarser gravel to prevent washing under the rack.

Daily visual counts were made of the numbers of fish in the trap to ascertain the number which had entered the trap during the preceding 24-hour period. This count was made by crowding all chinook salmon in the trap to the lower rack and counting them as they were slowly crowded back to the upper rack. As a rule, several counts were made each day and the maximum number recorded.

The Elk Creek trap was located approximately one mile above the confluence of Elk and Bear Valley Creeks, and at an elevation of about 6,500 feet above sea level.

II. SPAWNING. - The Chinook salmon which had entered the trap were seined periodically, examined for sex, degree of ripeness, and numbers. Small salmon (commonly called "jacks") were placed over the upstream rack. Whenever enough ripe females were taken they were killed, bled, and their eggs taken and fertilized. Eggs were transported to the McCall hatchery the same day they were taken. They were twice transported by station wagon over some 100 miles of mountainous, rough roads, and once transported by air to see if the method of transporting had any effect upon the eye-up.

III. TEMPERATURES, WEATHER, STREAM FLOW. - Daily records were kept of the air and water temperatures and weather. These readings and observations were taken at 8 a.m. and at 4 p.m. each day that the trip operated. A maximum and minimum record was thus approached. Stream flow was approximated four times during trapping operations by measuring the cross section of the stream

above the lower rack and multiplying this by surface velocity.

IV. EXAMINATION OF FISH FOR PHYSICAL CONDITION. - All spawned females and all salmon which died in the trap were grossly examined for external and internal lesions and for internal hemorrhage.

V. LENGTHS, WEIGHTS, SCALE SAMPLES. - The total and standard lengths and weights were taken of all fish spawned as well as sixteen additional fish. Lengths were taken with a flexible, steel tape; weights with a spring balance of 25 pound capacity.

Findings:

I. NUMBERS AND SEX RATION. - A total of 285 spring chinook salmon were trapped in Elk Creek from July 11 to July 31, inclusive. A few - possibly not more than eight - had ascended Elk Creek prior to the installation of the trap. The total number trapped include: a minimum of fifty fish which escaped the trap by jumping the upstream barrier, or which went under the racking when a section of stream bed washed out. Of these 285 fish, 114 were females and 171 were males, for a sex ratio of 1 female : 1.5 male.

II. SIZE OF FISH. - The approximate average weight of all salmon trapped was 12.66 pounds. This includes the smaller Chinooks, or "jack" salmon, which comprised 30 per cent of the fish trapped. A sample (42) of weights of larger fish - those exceeding eight pounds - gave an average of 15.8 pounds. The lengths of fish are not recorded here since they form part of another study dealing with age-growth up to the time they reach the ocean as fingerlings.

III. FECUNDITY. - A total of 132,860 green eggs were taken from the 26 females spawned, for an average of 5,110 eggs each.

IV. EYE-UP. - The 132,860 green eggs produced a total of 39,000 eyed eggs at the McCall hatchery for an eye-up of 30 per cent. The appearance of white-spot disease in these eggs, which may or may not have been due to physical condition of the fish, was definitely a contributing factor to the low percentage of eye-up.

No difference was found in the eye-up of green eggs transported to the McCall hatchery by car and those shipped by air.

V. CORRELATION OF SPAWNING ACTIVITY TO TEMPERATURE, WEATHER AND STREAM FLOW IS SHOWN IN TABLE 1.

VI. PHYSICAL CONDITION OF FISH. - A comparison, only, can be made regarding the physical condition of the fish, comparing the fish trapped in 1951 with those trapped in previous years (1947-1950, inclusive). Three males and 17 females died in the trap during the trapping operations. This seven per cent mortality is slightly higher than mortalities encountered in previous years (range: 2-5 per cent). Two additional facts were observed: The larger ratio of trapped fish showing gill-net marks, and the higher percentage of internal hemorrhage (notably of the female gonads) over previous years.

Analysis and Recommendations:

In comparison to the spring chinook salmon migration into Idaho the four years prededing 1951, this year's run exceeded those of 1948, 1949 and 1950. If the sport fishery catch is included in the tabulation, the 1951 migration equaled or exceeded the 1947 run except in Marsh Creek and tributaries where it was below the 1947 migration both in total numbers and in the numbers which spawned successfully.

All of the factors involved in the size of the salmon migration and the ratio of "jacks" to large fish, will be considered in detail in Work Project III.

The physical condition of the fish when they arrived on the spawning beds was below that of previous years. This may be due to: Additional loss of time at downriver dams both complete and under construction, injuries sustained in temporary fish ways at McNary dam or at the commercial or sport fishery, injuries sustained at Dagger Falls on the Middle Fork, or to a combination of these and other unknown factors.

It appears that the peak of the migration into Elk Creek is reached and spawning started when water temperatures have reached a minimum of 54° F., and a maximum of 65° F., and these temperatures maintained for several days.

Future trapping operations should start no later than July 1 and should extend through August 15, so that all salmon migrating into Elk Creek may be counted. A larger sample of fish should be used for obtaining the average size and the use of a thermograph or at least a maximum-minimum thermometer is desirable for more accurate temperature records.

Summary:

A total of 285 adult, spring chinook salmon were trapped on Elk Creek. These salmon had an average weight of 12.6 pounds; a sex share of 1 female : 1.5 males; and were divided by size into 30 per cent "jack" salmon (weighing less than eight pounds) and 70 per cent larger salmon (exceeding eight pounds in weight).

A total of 132,860 eggs were taken from 26 females for an average of 5,110 eggs per fish.

Physical condition of the fish was below that for the preceding four years, with the appearance of larger numbers of fish bearing gill-net marks, an increase in natural mortality in the trap, and an increase in the number of females with hemorrhaged ovaries. The eggs were of inferior quality to those taken the four preceding years as was indicated in the eye-up (30 per cent) and the hatch (21 per cent).

Page - 4 -
TABLE 1

SPAWNING: CORRELATION TO TEMPERATURE, WEATHER, AND STREAM FLOW

DATE	TEMPERATURES				FISH ENTERING TRAP	APPROX. STREAM FLOW,CFS	SPAWNING ACTIVITY	WEATHER
	AIR Min.	Max.	WATER Min.	Max.				
7/10	--	--	--	--	0	247		---
11	--	--	--	--	5			---
12	50	--	46	--	30			Clear
13	60	79	52	59	1			"
14	56	77	52	58	16			"
15	66	74	53	60	30			"
16	62	74	53	63	8			"
17	62	75	53	3	10	220		"
18	62	78	54	65	22			"
19	64	78	54	54	65	11		P.Cloudy
20	62	77	54	65	35	180	Fish digging nets	Clear
21	62	79	53	65	20		" " "	P.Cloudy
22	63	79	53	65	10		" " "	Clear
23	62	73	53	62	10		" " "	P.Cloudy
24	62	73	53	62	5		" " "	"
25	56	73	53	62	5		4 spent fish 6 fish spawned	"
26	55	75	53	63	2			Clear
27	60	76	54	65	3			"
28	57	65	57	65	12		3 spent fish 10 fish spawned	Cloudy,rain
29	55	64	55	64	32			Cloudy
30	54	62	54	62	18			P.Cloudy
31	--	--	--	--	--	172	3 spent fish 10 fish spawned	"

Data and Reports:

Original data and relating reports are in the files of the
Idaho Fish and Game Department, 518 Front Street, or in the files
At the Fisheries Laboratories, 129 Broadway, in Boise, Idaho.

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IDAHO FISH AND GAME DEPARTMENT

Date: February 1, 1952

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